Deployment Radar Test Procedures

The following tests provide a minimum level of confidence that a radar is functioning properly. Tests should be done on the following subsystems:

- RPG Log
  - View RPG log for RDA alarms
- Transmitter
  - Transmitter power and the klystron pulse envelope need to be tested
- Receiver
  - Critical and shared path calibration need to be tested, and noise levels need to be examined
- Antenna/Pedestal
  - Antenna positioning (Sun Check) and rate accuracy needs to be verified
- Power
  - Power Transfer needs to be tested, site power needs to be verified
- Shelter
  - External alarms need to be checked, proper operation of some critical switches
- Communications
  - Phone line dial tone and CSU loopback to RPG. Those sites with hard connections to the RPG only need to have the surge suppressor checked. MLOS sites will possibly need additional checks.

Since we are replacing the signal processing of the system, there is no need to test the legacy signal processing. The same is true of the IF/analog portion of the receiver. Communications is only for the link to the RPG and the Phone line for maintenance, since all other communications gear is being replaced (VME chassis and RRRAT).

Test Design Goals:

- as little disruption to the system as possible.
- require a minimally trained technician
- completed as quickly as possible
- be automated as much as practical

1. RPG Log
   a. At the WFO, view the RPG Log for RDA alarms
   b. Document alarms for the last 3 days
2. Transmitter
   a. View performance data while radar is running.
      i. Verify 650-750KW peak transmitter power
      ii. Check all 15 positions of transmitter switch, verify filament, focus coil, and vacuum pump current
   b. Gather adaptation data
      i. Use ORDA automated system if available
      ii. TR's needed for path loss estimation, pulse width
   c. TERP FLOYD
   d. RDASOT
      i. Run transmitter diagnostics
      ii. Start transmitter in short pulse, PRT 5
   e. View power and pulse shape at 4J25, calculate peak power
   f. Measure RFD power at 4J17

    g. Vary PRT from 1-8 for short pulse, vary PRT from 1 to 3 in long pulse
3. Receiver
    a. View performance data while radar operating
        i. Verify SPLCN (Short Pulse Lin Channel Noise), Noise Temp, calibration page, clutter rejection, others
    b. Gather adaptation data
        i. Use ORDA automated system if available
        ii. R's needed for path loss estimation, noise source
    c. TERP FLOYD
    d. RDASOT
        i. Run receiver diagnostics
        ii. Start CW injection into front end
    e. Measure power at 4J15 and 4J16 ("Inclement Weather Procedure" from technical manual)
    f. Run test attenuator calibration
4. Antenna/Pedestal
    a. Observe performance data during operation
        i. Antenna power supplies, other alarms
    b. TERP FLOYD
    c. RDASOT
        i. Run pedestal diagnostics
        ii. Set up antenna manual control
    d. Command antenna rate and position in az and el, observe results
    e. Run Suncheck
        i. Verify position within .30 degrees
        ii. System gain check requires solar flux values and a properly calibrated Noise Source
5. Power
    a. Observe performance data during operation
        i. Maintenance console, automatic transfer switch, TPS control panel
    b. Command transfer to generator power
        i. Observe switch with no disruption, time results
    c. Time automatic retransfer of power
6. Shelter
    a. Observe performance data
        i. Verify no alarms
        ii. Verify analog values within normal ranges
    b. Set/Clear security alarms
        i. Verify alarms work on all buildings
7. Communications
    a. Observe performance data
        i. Wideband page
    b. CSU loopback test (not necessary if wideband page looks good in performance data)
    c. Verify phone line into RRRAT working
        i. By dial tone or actual call into RRRAT

Many of these tests can be run in parallel (i.e. do all performance data tests before shutting down the system, then do all RDASOT tests). All of these tests are independent, so order is not critical.

There will be a checklist for the deployment team to put values into and initial, and a place for the Government representative to initial. The best way to do this would be to have this checklist on the deployment teams laptop, with an autofill for the adaptation data from the legacy download. This would automate as much of the procedure as possible and reduce errors.

The results of these tests would be used as a baseline for installation, and the INCO tests would show no degradation of any subsystem. This would validate to the site their radar is running as well or better than it was before ORDA installation.

POSSIBLE PROBLEM AREAS:

- General
    - If tests don't pass, who's responsible for repair? ORDA deployment teams are not trained to repair WSR-88D's
    - Repairs may take significant time to accomplish
    - Who determines severity of test failure?
    - Who determines if a test failure will prevent ORDA installation?
    - Deployment technician only minimally trained, may miss things in analysis of results
    - Deployment technicians will not know if these tests indicate other tests should be done
    - These tests are a bare minimum of system performance tests
    - The percentages for each area are an estimate of failures in a non-tested radar (failure meaning any anomalous test result, not necessarily critical)
- Transmitter (10-15 percent)
    - Transmitter alignment can take a significant amount of time for a technician
    - Long pulse not used frequently by a lot of sites, high risk test
        - Long pulse failures can often be fixed by raising filament current and aligning transmitter
- Receiver (15-20 percent)
    - Problems in critical and shared path can take significant time to isolate and repair
    - Clutter rejection problems can be hard to diagnose
    - Problems with test attenuator can be masked
    - Does not test accuracy of Noise Source
- Antenna/Pedestal (5-10 percent)
    - Encoder problems can require encoder alignment, a lengthy procedure.
    - Trained technician needed to identify other pedestal problems
        - Noisy pedestal
        - Motor problems
        - Slip rings
- Power (5-10 percent)
    - This test does not address Automatic Transfer Switch programming check
    - Generator failures
- Shelter (0-5 percent)
    - Many things to fail in shelter, only test a subset of them
- Communications (5-10 percent)
    - T1 line problems can be difficult to find and repair